DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1, 3, 5, 6, and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pelrine et al. (US 2002/0122561) in view of Nilsson (US 4539575).

3. With respect to claim 1, Pelrine et al. discloses a cladding (Fig 6) comprising: an elastic boundary layer (item 72) which forms the surface of the cladding (Fig 6), and a polymer actuator (Abstract and paragraph 17) in the form of a membrane actuator which forms the cladding for the deformation of the boundary layer (Fig 6).

Pelrine et al. does not disclose expressly that the cladding bears on a substrate by means of a bearing area which matches the surface area of the cladding in terms of magnitude, with only subregions of the bearing area being fixed to the substrate.

Nilsson teaches a piezoelectrically driven cladding (item 13 and 14) wherein the cladding bear on a substrate (item 10) by means of a bearing area which matches the surface area of the cladding in terms of magnitude, with only subregions of the bearing area being fixed to the substrate (Fig 1).

In combination, the piezoelectrically driven cladding of Nilsson would replace the polymer-actuator driven cladding of Pelrine et al. This would result in the cladding (Fig 1 of Nilsson) bearing on the substrate ((item 78 of Pelrine et al.) by means of a bearing

area which matches the surface area of the cladding in terms of magnitude and bears fully on the substrate (Fig 1 of Nilsson and Fig 6 of Pelrine et al.), with only subregions of the bearing area being fixed to the substrate (Fig 1 of Nilsson).

At the time of invention, it would have been obvious to a person of ordinary skill in the art to combine the equal-bearing-area configuration of Nilsson with the electroactively driven cladding of Pelrine et al. for the benefit of preventing undesired deformations in the cladding due to expansion and contraction of the cladding materials.

4. With respect to claim 3, the combination of Pelrine et al. and Nilsson discloses the cladding as claimed in claim 1. Both Pelrine et al. and Nilsson disclose that the cladding is fixed to the substrate at regular intervals in a punctiform manner (Fig 6 of Pelrine et al. / Fig 3 of Nilsson).

5. With respect to claim 5, the combination of Pelrine et al. and Nilsson discloses the cladding as claimed in claim 1. Pelrine et al. discloses that said cladding is composed of individual lamellae which are each fixed to the substrate by means of one end, with the lamellae each being polymer actuators in the form of bending actuators (Fig 6).

6. With respect to claim 6, Pelrine et al. discloses a cladding (Fig 6) comprising: an elastic boundary layer (item 72) which forms the surface of the cladding (Fig 6), and a polymer actuator (Abstract and paragraph 17) in the form of a membrane actuator which forms the cladding for the deformation of the boundary layer (Fig 6), and having at least one electrode layer (Abstract) for the polymer actuator, which electrode layer extends only over a subregion of the polymer actuator (as the individual elements are driven

individually, the electrodes that drive the elements must be separate from each other; therefore, the electrode layer would extend over only a subregion of the polymer actuator.)

Pelrine et al. does not disclose expressly that the cladding bears on a substrate by means of a bearing area which matches the surface area of the cladding in terms of magnitude, with the cladding being firmly connected to the substrate by means of the entire bearing area.

Nilsson teaches a piezoelectrically driven cladding (item 13 and 14) wherein the cladding bear on a substrate (item 10) by means of a bearing area which matches the surface area of the cladding in terms of magnitude, with the cladding being firmly connected to the substrate by means of the entire bearing area (Fig 1).

In combination, the piezoelectrically driven cladding of Nilsson would replace the polymer-actuator driven cladding of Pelrine et al. This would result in the cladding (Fig 1 of Nilsson) bearing against the substrate ((item 78 of Pelrine et al.) by means of a bearing area which matches the surface area of the cladding in terms of magnitude and bears fully on the substrate (Fig 1 of Nilsson and Fig 6 of Pelrine et al.).

At the time of invention, it would have been obvious to a person of ordinary skill in the art to combine the equal-bearing-area configuration of Nilsson with the electroactively driven cladding of Pelrine et al. for the benefit of preventing undesired deformations in the cladding due to expansion and contraction of the cladding materials.

7. With respect to claim 9, the combination of Pelrine et al. and Nilsson discloses the cladding as claimed in claim 1. Pelrine et al. discloses that the boundary layer is in

the form of an auxiliary layer on the polymer actuator (electrode layer on surface of electroactive polymer layers).

8. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Pelrine et al. in view of Nilsson and Maushard et al. (US 6803700).

9. With respect to claim 4, the combination of Pelrine et al. and Nilsson discloses the cladding as claimed in claim 1.

Neither Pelrine et al. nor Nilsson discloses that the cladding is provided with through-holes.

Maushard et al. teaches a piezoelectric actuated cladding, in which the cladding (item 10) is provided with a through-hole (item 36).

At the time of invention, it would have been obvious to a person of ordinary skill in the art to combine the through-hole of Maushard et al. with the cladding of Pelrine et al. as modified by Nilsson for the benefit of reducing the resistance to bending of the cladding (column 3, lines 36-38).

10. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Pelrine et al. in view of Nilsson and Kihara et al. (US 2002/0043901).

11. With respect to claim 7, the combination of Pelrine et al. and Nilsson discloses the cladding as claimed in claim 6.

Neither Pelrine et al. nor Nilsson discloses expressly that the electrode layer forms the webs of a honeycomb-like structure on the polymer layer.

Kihara et al. teaches a piezoelectric device in which the electrode is in the form of the webs of a honey-comb-like structure (Fig 8D).

At the time of invention, it would have been obvious to a person of ordinary skill in the art to combine the honeycomb-like electrode of Kihara et al. with the cladding of Pelrine et al. as modified by Nilsson for the benefit of allowing for easy fabrication (Paragraph 85 of Kihara et al.).

12. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Pelrine et al. in view of Nilsson and Dydyk (US 5596239).

13. With respect to claim 8, the combination of Pelrine et al. and Nilsson discloses the cladding as claimed in claim 6.

Neither Pelrine et al. nor Nilsson discloses expressly that the substrate forms an electrode for a polymer layer of the polymer actuator.

Dydyk teaches a piezoelectric actuator in which the substrate (Fig 3, item 159) forms an electrode for the piezoelectric layer (item 150) of the piezoelectric actuator (Fig 3).

At the time of invention, it would have been obvious to a person of ordinary skill in the art to combine the electrode arrangement of Dydyk with the cladding of Pelrine et al. as modified by Nilsson for the benefit of permitting a wider range of electrode materials to be used as the electrode (column 5, lines 19-24).

14. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Pelrine et al. in view of Nilsson, Kihara et al., and Dydyk.

15. With respect to claim 10, the combination of Pelrine et al., Nilsson, Kihara et al., and Dydyk discloses the cladding as claimed in claim 7.

None of Pelrine et al., Nilsson, or Kihara et al. discloses expressly that the substrate forms an electrode for a polymer layer of the polymer actuator.

Dydyk teaches a piezoelectric actuator in which the substrate (Fig 3, item 159) forms an electrode for the piezoelectric layer (item 150) of the piezoelectric actuator (Fig 3).

At the time of invention, it would have been obvious to a person of ordinary skill in the art to combine the electrode arrangement of Dydyk with the cladding of Pelrine et al. as modified by Nilsson and Kihara et al. for the benefit of permitting a wider range of electrode materials to be used as the electrode (column 5, lines 19-24).

Response to Arguments

16. Applicant's arguments filed 28 October 2009 have been fully considered but they are not persuasive.

17. Applicant argues that the cladding of Nilsson does not bear fully on the substrate as applicant alleges that the presence of the opening (item 12) of Nilsson would cause the bearing area to not bear fully on the substrate while matching the surface area of the cladding in magnitude. However, in combination, the piezoelectrically driven cladding of Nilsson would replace the polymer-actuator driven cladding of Pelrine et al. This would result in the cladding (Fig 1 of Nilsson) bearing on the substrate ((item 78 of Pelrine et al.) by means of a bearing area which matches the surface area of the cladding in terms of magnitude and bears fully on the substrate (Fig 1 of Nilsson and Fig 6 of Pelrine et al.), with only subregions of the bearing area being fixed to the substrate (Fig 1 of Nilsson).

18. Applicant argues that modifying Pelrine with Nilsson would not have been obvious as applicant alleges that Pelrine requires holes in the substrate and that the proposed combination of Pelrine and Nilsson would render Pelrine unsatisfactory for its intended purpose. However, the section of Pelrine cited by applicant in support of this position makes no mention of a need or desire for holes in the substrate, and it does not appear that Pelrine requires such holes anywhere in the disclosure of Pelrine.

Conclusion

19. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL.** See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Derek J. Rosenau whose telephone number is

(571)272-8932. The examiner can normally be reached on Monday thru Thursday 7:00-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Walter Benson can be reached on (571) 272-2227. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Derek J Rosenau/
Examiner, Art Unit 2837

/Walter Benson/
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